

Agent-Based Simulation and Assessment of NAS Security and Safety, Phase I

Completed Technology Project (2005 - 2005)



Project Introduction

The key innovation proposed here is the use of agent-based modeling and simulation to evaluate the safety of the National Airspace under crisis operations and develop tools for real-time planning, scheduling, and resource allocation decision aids for crisis management. We view the problem as one of simulating and controlling the emergent behavior of autonomous agents (aircraft and air traffic service providers in this case) in crisis situations. We propose to use NASA's agent-based Airspace Concept Evaluation System as the modeling framework into which we will integrate our models. We propose to evaluate the impacts of these malicious agents on the safety of NAS by using simulation to assess short term and long term NAS-wide safety impacts in terms of loss of separation, near misses, collisions, re-routes, controller workload, and economic impacts. The agent-based system will provide a real-time planning, scheduling, and resource allocation decision aid to be used for crisis management, by providing the user capabilities to develop and execute playbooks that represent various policies. Finally, we propose to develop safety metrics that will provide command center traffic management coordinators indicators to predict off-nominal activities in the airspace.

Anticipated Benefits

The simulation system developed in this effort can be adapted and modified for military for use in simulation war-gaming scenarios. The proposed technology can also be adapted to developed crowd management strategies in crisis settings. Our primary customers for this effort will be NASA. Following September 11, 2001, NASA has recognized the need for shared responsibility for improving homeland security. A successful Phase I effort will result in a modeling, simulation and decision support tool that will enable policy makers to use simulation to evaluate and assess impacts of possible threats to the NAS, and develop strategies to reduce vulnerability. Specify benefits will be to bale to assess system-wide security risk assessment and incident precursor identification. The simulation tool with its associated metrics will also enable policy makes to evaluate economic impacts of safety policies.



Agent-Based Simulation and Assessment of NAS Security and Safety, Phase I

Table of Contents

Project Introduction	1
Anticipated Benefits	1
Organizational Responsibility	1
Primary U.S. Work Locations and Key Partners	2
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

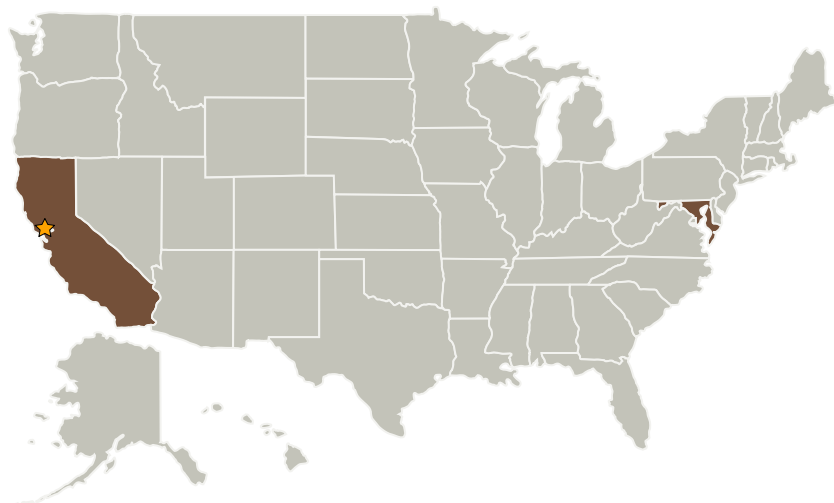
Small Business Innovation Research/Small Business Tech Transfer

Agent-Based Simulation and Assessment of NAS Security and Safety, Phase I

Completed Technology Project (2005 - 2005)



Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Intelligent Automation, Inc.	Supporting Organization	Industry	Rockville, Maryland

Primary U.S. Work Locations

California	Maryland
------------	----------

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Larry Meyn

Principal Investigator:

Vikram Manikonda

Technology Areas

Primary:

- TX16 Air Traffic Management and Range Tracking Systems
 - └ TX16.3 Traffic Management Concepts